

Appl. No. 10/605,537  
Response dated 10/22/2004  
Reply to Office Action of 4/22/2004

### AMENDMENTS TO CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

#### Listing of Claims

1) (AMENDED) A microfluidic device comprising:

a first compartment and a second compartment ~~coupled by a region having micron-sized grooves~~, where said first compartment is configured to accept a first volume of fluid and said second compartment is configured to accept a second volume of fluid where said second volume of fluid is lesser than said first volume of fluid is capable of being fluidically;

said first compartment and said second compartment being coupled by a barrier region having at least one groove with dimensions in a micron range; and

said at least one groove configured to provide a pathway between said first compartment and said second compartment where said second volume of fluid is fluidically isolated from said second first compartment volume of fluid via hydrostatic pressure caused by a difference in volume between said first volume of fluid and said second volume of fluid.

2) (ORIGINAL) The microfluidic device of claim 1 wherein said first compartment comprises a somal compartment.

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- 3) (ORIGINAL) The microfluidic device of claim 2 wherein said second compartment comprises a neuritic compartment.
- 4) (ORIGINAL) The microfluidic device of claim 3 wherein neuron processes grow from said first compartment to said second compartment.
- 5) (AMENDED) The microfluidic device of claim 4 where ~~insults~~ treatments introduced to said second compartment stay substantially within said second compartment.
- 6) (AMENDED) The microfluidic device of claim 4 where patterned lines enable ~~targeted~~ directed growth of said neuron processes.
- 7) (ORIGINAL) The microfluidic device of claim 6 wherein said patterned lines comprise polylysine.
- 8) (ORIGINAL) The microfluidic device of claim 1 wherein said microfluidic device is covalently bonded to glass via air plasma treatment.
- 9) (ORIGINAL) The microfluidic device of claim 1 wherein said microfluidic device is pressed to a culture dish to create a water-tight seal.

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10) (NEW) The microfluidic device of claim 1 wherein said microfluidic device is pressed to a glass to create a water-tight seal.

11) (NEW) A microfluidic device comprising:

a first compartment and a second compartment, where said first compartment comprises a cell body and is configured to accept a first volume of fluid and said second compartment is configured to accept a second volume of fluid which is lesser than said first volume of fluid;

said first compartment and said second compartment being coupled by a barrier region having at least one groove with dimensions in the micron range; and

said at least one groove is configured to provide a pathway for growing neuron processes from said cell body within said first compartment to said second compartment where said second volume of fluid is fluidically isolated from said first volume of fluid while said second volume of fluid is lesser than said first volume of fluid.

12) (NEW) The microfluidic device of claim 11 where said second volume of fluid comprises a treatment to be applied to said neuron processes and said treatment stays substantially within said second compartment as a function of hydrostatic pressure.

13) (NEW) The microfluidic device of claim 11 where said first volume of fluid comprises a treatment to be applied to said neuron processes and said treatment stays substantially within said first compartment as a function of hydrostatic pressure.

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14) (NEW) The microfluidic device of claim 11 where patterned lines of polylysine extend through said at least one groove to enable directed growth of said neuron processes between said first compartment and said second compartment.

15) (NEW) The microfluidic device of claim 11 further comprising at least one loading inlet.

16) (NEW) A microfluidic device comprising:  
a somal compartment and a neuritic compartment, where said somal compartment comprises a cell body and contains fluid for maintaining viability of said cell body;  
said somal compartment and said neuritic compartment coupled by a barrier region  
having at least one groove with dimensions in the micron range; and  
said at least one groove serves as a pathway for neuron processes to grow from said cell body within said somal compartment to said neuritic compartment.